SOIL SURVEY OF MORRIS COUNTY, TEXAS.

By E. B. WATSON and RISDEN T. ALLEN.

DESCRIPTION OF THE AREA.

Morris County is situated in the northeastern part of Texas, about 30 miles from both the east and the north borders of the State. It lies between meridians 94° 39′ and 94° 50′ west longitude, and parallels 32° 53′ and 33° 23′ north latitude. It is bounded on the north by Red River and Bowie counties, on the east by Cass County,

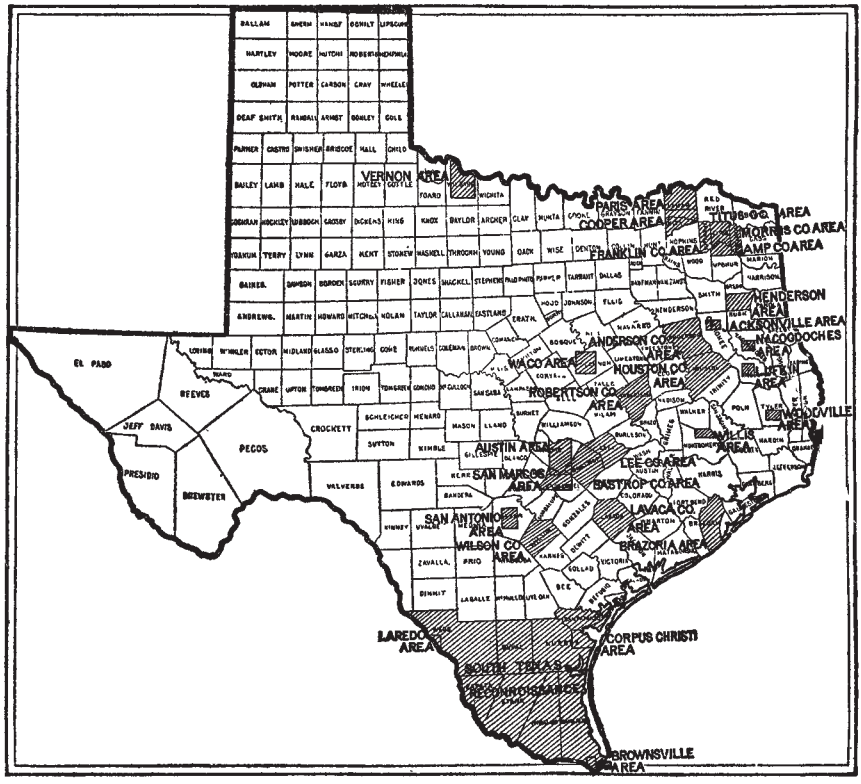


FIG. 32.—Sketch map showing location of the Morris County area, Texas.

on the south by Marion and Upshur counties, and on the west by Titus and Camp counties. It is 9 miles from east to west and 34 miles from the extreme northern tip to the southern boundary. It is one of the smaller counties of the State and contains 169,600 acres, or 265 square miles.

The surface of the county for the most part is gently rolling. It varies in elevation from 245 feet on Big Cypress Creek and 258 feet above sea on the Sulphur River to approximately 500 feet on the highest hills. The Sulphur River forms the northern boundary of the county, flowing in a southeasterly direction. White Oak Creek enters the county 6 miles south of the Sulphur River and flows in an easterly direction, joining the river near the east county line. Each of these streams is bordered by wide bottoms and between these bottoms is a low, level ridge. These streams control the drainage of the northern third of the county. The watershed is only a short distance south of White Oak Creek and the slope of the north side of this watershed is comparatively steep. The drainage of the southern two-thirds of the county flows south and southeast; the slope here is much more gradual, and erosion consequently has been of a different character. A ridge extends from White Oak Creek to the southern end of the county, and this forms a natural watershed, within which are some fair-sized hills. None of these, however, is too high or rough for cultivation, except in the extreme southern part of the county. Here there are some rough, steep hills, locally called "mountains," which are unfit for cultivation. They are capped with the broken remains of a stratum of ferruginous sandstone. The drainage on the west of this ridge is collected by Boggy Creek and is delivered to Big Cypress Creek, which forms a part of the southern boundary. That on the eastern side is collected by Kelly and Black Cypress creeks, which carry it to the southeast, and by Britton Creek, which finds its way south into Big Cypress Creek.

All the streams of the county, with the exception of the short materals, have arrived at the stage of extreme old age and have broad flood plains which are subject to annual overflow. Through these flood plains or bottoms the streams wind in very tortuous channels, and there are numerous oxbow lakes and deserted channels, some of which make lakes of fair size.

The first settlers came to the county in 1839 and located on the high land near the present site of Daingerfield, where they built a fort to protect themselves against the Indians. These pioneers came from Tennessee. Settlement was very slow for the next ten years, but during the fifties there were large inflows from Tennessee, Georgia, and Alabama. These later immigrants settled on the high lands situated in the central and southern parts of the county and chose the sandy and red gravelly soils found there. The present population, which is between 9,000 and 10,000, is composed almost entirely of the descendants of these early settlers. A few people have come in later from other southern States; there are no foreigners. The population is now about 65 per cent white and 35 per cent negro.

Thirty per cent of the county is cleared and farmed. Probably half of the uncleared land is unfit for cultivation on account of liability to flooding or because the surface is too rough and steep. Much of the original forest remains, and the lumber business is quite important. Numerous small sawmills are operating in the southern part of the county, and a large mill at Naples is cutting timber from the northern part.

Morris was originally a part of Titus County, but was organized as a separate county in 1876. There are no cities or incorporated towns in the county. The court-house is located at Daingerfield, in the southern part of the county. It is the oldest town and has a population of about 1,000. Cason is west of Daingerfield, on the border of the county. It has a population of about 250. Both of these places are on the Missouri, Kansas and Texas Railway. Naples and Omaha, in the northern part of the county, are on the Cotton Belt Railway. Naples has about 1,200 and Omaha about 650 population. A canning factory, which utilizes the surplus fruit and vegetables of the neighborhood, is located at Omaha. A cotton-seed oil mill is located at Daingerfield, and there is also one at Omaha.

Prior to the advent of the railroads, cotton, which was the only crop grown for shipment, was hauled by teams to Jefferson, 30 miles southeast of Daingerfield, and from there shipped by boat to New Orleans. At the present time two railroads pass through the county from east to west. The St. Louis Southwestern, generally called the Cotton Belt Railway, crosses the northern part of the county and gives an excellent outlet, especially for fruit and truck, which is destined for the northern markets. The Missouri, Kansas and Texas Railway crosses the southern part of the county and makes an outlet for the cotton and live stock, but the shippers of fruit, potatoes, and other truck are handicapped because the goods have to be transferred to other lines to reach the northern markets. This makes a long, expensive haul, and the products may not arrive in good condition. This state of affairs has a depressing influence on the development of diversified agriculture in the southern part of the county.

Cotton is sent to the compress at Pittsburg, Camp County, whence it is shipped to Galveston for export. Fruit, potatoes, tomatoes, and other vegetables are sent to the northern markets, or are canned and then shipped to all parts of the country. Cane sirup goes to west Texas. Corn, peanuts, hay, and forage crops are utilized within the county.

CLIMATE.

The climate of Morris County is mild and agreeable, the most unpleasant feature being the long-continued hot weather of summer. According to the Weather Bureau station at Paris the average num-

ber of days each year for the ten years ending 1903 on which the temperature exceeded 100° was 17. There are about eight months between the last killing frost in the spring and the first one in the fall, and this gives a long growing season, enabling a succession of crops on the same land.

From October until June the weather is delightful, the majority of the days being bright and pleasant and the nights cool. Plowing and all kinds of farm work can be done during every month in the year, and live stock needs little protection. An occasional sudden fall of temperature occurs, producing brief periods, locally called "northers," due to cold waves from the north. These periods are rarely more than two or three days in length and are not frequent. Tornadoes occur occasionally and do considerable damage in their narrow paths.

The following table, compiled from the records of the Weather Bureau stations at Paris and Sulphur Springs, gives the normal monthly and annual temperature and precipitation, together with other data. These places are only a short distance outside of Morris County and doubtless represent with fair accuracy the local conditions.

Normal monthly, seasonal, and annual temperature and precipitation at Paris, Tex.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	46	80	5	2.1	1.9	3.4	0.5
January	45	83	8	2.1	3.1	0.4	1.8
February	44	84	−13	2.0	0.3	2.2	1.4
Winter	45			6.2	5.3	6.0	3.7
March	55	92	18	3.5	0.6	4.0	0.0
April	65	96	29	2.9	3.2	4.7	0.0
May	71	96	38	4.5	2.4	4.3	0.0
Spring	64			10.9	6.2	13.0	0.0
June	78	104	46	3.3	1.2	2.0	0.0
July	83	108	60	3.1	1.5	4.6	0.0
August	82	110	57	2.0	T.	0.1	0.0
Summer	81			8.4	2.7	6.7	0.0
September	76	106	42	2.8	0.6	6.7	0.0
October	66	95	33	2.3	3.0	3.8	0.0
November	54	85	18	2.7	0.6	11.9	0.0
Fall	65			7.8	4.2	22.4	0.0
Year	64	110	−13	33.3	18.4	48.1	3.7

Normal monthly and annual temperature and precipitation at Sulphur Springs, Tex.

Month.	Temperature.	Precipitation.	Month.	Temperature.	Precipitation.
	°F.	Inches.		°F.	Inches.
January	47.8	2.51	August	83.4	2.51
February	45.8	2.30	September	78.4	2.93
March	57.0	3.90	October	67.8	3.16
April	66.0	3.15	November	53.8	3.39
May	70.7	4.84	December	46.6	3.10
June	80.3	3.01			
July	83.1	4.44	Year	65.3	39.24

From these tables it will be seen that the hottest period is from June to September, the average of these months being 80° F. The coldest period is from December to February, with an average temperature of 46° F. The rainfall is ample for crop growth, averaging 36 inches at these two places. It is usually well distributed throughout the year, though dry years occur occasionally and cause considerable loss. During the driest year only 18.4 inches of rain fell at Paris, and during the four hottest months there was only 3.3 inches of rain. Such extreme seasons are, however, rare.

On the whole the climate is very favorable to the growing of cotton, vegetables, fruit, and a great variety of other crops.

AGRICULTURE.

Morris County lies wholly within the East Texas Timber Belt, and the entire county was originally covered with a dense growth of timber. In the northern part the forests were composed almost entirely of deciduous trees, oaks of various species, hickory, walnut, ash, elm, and gum, besides many species of lesser value. Forests in the southern part of the county not only contain these species, but also on the uplands a large proportion of the valuable shortleaf pine.

The early settlers made clearings in this forest to begin farming. They cut out the smaller growth, deadened the large trees, and did what plowing could be done among the stumps and roots, and put in cotton or corn. These were the main crops grown at the start. Cotton was the money crop and corn provided a large part of the food for both the farmer and his stock. The cultural methods were such as prevailed throughout the South, namely, ridge culture, plowing and cultivating with a single mule, and a large amount of hand work. Cotton was planted without rotation as long as it could be grown profitably, and the other crops were produced only for home consumption. This one-crop system was followed without change by practically everybody until within the last ten years, and is still

followed by a majority of the farmers, especially the tenants. However, in spite of this poor system of farm management, comparatively few fields have dropped so low in productiveness as to be considered worn out and consequently abandoned. This shows the inherent productiveness of the soil. Many of these fields have been cultivated continuously for fifty or even sixty years, and are still producing fair crops. Only in late years have commercial fertilizers been used. A few of the better farmers have practiced the saving of barnyard manure, and they even gather leaf mold in the forests to apply to the fields. Where this practice is coupled with a rotation which includes a legume it has been found that the productiveness has not declined.

Agriculture at the present time is in a transitional stage. The farmers are learning to diversify their crops and to use better cultural methods. Still the old methods largely prevail and very much remains to be changed before agriculture becomes as profitable as it is capable of becoming. Cotton is the main crop, and, by the tenant farmer especially, is grown without rotation, year after year, by primitive methods. Just about half of the cultivated area is given up to it. The average yield is not over one-third bale to the acre. This low yield gives little if any profit to the grower, and the effect is seen in the poor houses and scant equipment on most of the farms. The better farmers are practicing a rotation of crops and growing more cowpeas than formerly. A favorite method with potato growers is to plant the potatoes in rows 5 or 6 feet apart, fertilize heavily, and plant cotton between the rows. Three-fourths bale of cotton per acre has been secured by this method, besides a very profitable crop of potatoes. More attention is being paid by these men to planting improved varieties of cotton, and, especially since the advent of the boll weevil, to planting early varieties. Level surface culture is also gaining favor. Cotton gins are plentiful throughout the county. The usual toll for ginning is from one-sixteenth to one-twentieth of the cotton. The owner of the cotton keeps the seed, which equals about 1,000 pounds for each 500-pound bale of lint. Cotton is grown on all the cultivated soils of the area. The farmers are learning to combat the boll weevil by selecting early varieties of cotton, practicing clean culture, planting the rows farther apart, and applying a little fertilizer at the start to hasten the growth.

Corn is the next crop in importance. It is grown for home use or for consumption within the county. Not enough is produced, however, to supply the demand, and this, as well as other stock feed, has to be shipped in in large quantities. Oats are grown in a limited way and a little hay is made from Bermuda grass.

Irish potatoes are the favorite crop for those who are trying to diversify. One hundred and eighty-nine carloads were shipped from the county during the season of 1908. They have been found very

profitable. They yield from 40 to 125 bushels and occasionally 225 bushels per acre, averaging about 70 bushels. As they go to the early northern markets the prices are good, averaging about 75 cents a bushel at the car. A second crop is grown which is largely saved for seed. This yields about half as much as the early crop. Potatoes are found to do best on the lighter soils and the Norfolk fine sand is esteemed very highly for them.

A number of commercial peach orchards are found in the northern part of the county. The highest grade of peaches is grown here. Seasons of failure are relatively rare, and do not occur more than one year out of four or five. These orchards undoubtedly will be very profitable when market facilities are better developed. As it has been in the past, the transportation companies and the commission merchants have absorbed the great bulk of the profit in growing the crop. The Susquehanna soils are best suited to peaches, especially the gravelly loam. Eleven carloads of watermelons were shipped from Omaha in 1908. Tomatoes are also grown in this neighborhood and have been found very profitable. Many are taken by the canning factory located there. Beans and other garden truck are also canned, as well as sweet potatoes, blackberries, and the surplus peaches, 13 cars of finished products being sent from here in 1908. A good many peaches are canned by the farmers, who have small canning outfits on their farms. Peanuts are grown by a few farmers and are found quite profitable. Cowpeas are increasing in favor continually. They are now grown quite largely as a soil renovator and as a stock feed.

Sweet potatoes are grown for home consumption and only a few are shipped. Sugar cane does not occupy a large acreage, being grown mainly in small areas on sandy bottoms, but the yield is so heavy that the industry is of considerable importance. The crop is made into sirup. Numerous small mills are scattered over the county, for the crop is so bulky that it is best to have the mill close to the field. The local demand is supplied and considerable sirup is shipped to western Texas, where it can not be made. Over 3,000 gallons are produced annually. The ordinary selling price is 50 cents a gallon.

Pecan growing is very promising. One orchard of 500 trees near Naples is just coming into bearing. One other large orchard and several smaller ones have been set out. There is a very strong demand for the improved varieties of pecans and the tree is a sure bearer, healthy, and very long lived. The tree does exceedingly well on the Susquehanna gravelly loam and also on the bottom soils. The bearing orchard is 11 years old from the nuts and has produced one light crop.

The native persimmon also seems worthy of consideration and trial, for it seems likely that it could be turned to a large profit. At

present it is quite a nuisance on old cultivated fields, especially on sandy land. The sprouts could be budded or grafted to improved native varieties, for which a ready market should be found. The tree is hardy, free from disease, and long lived. A citizen of Jackson County, Missouri, has an orchard of 200 trees which are regular and abundant in their bearing and he considers the persimmon the most profitable fruit he grows.

The live stock of the county has increased in number and value as the population has increased, until now there is a fair supply, but the quality is still inferior to what it should be. The free range has been restricted, until at the present time it is against the law for stock to run at liberty anywhere in the county. However, in the extreme northern part, by common consent of the landowners, stock is still allowed to range. Large numbers of hogs and cattle are kept on the bottoms during the fall and winter. When fat they find a ready market at Fort Worth. During the hottest part of the year the mosquitoes and other insects are so bad that this range has little value.

The roads of the county are generally in poor condition. Most of the streams have no bridges or culverts over them. Stumps and gullies are abundant. It is only in the towns and near them that any attempt is made to grade the roads properly and to keep them in repair.

Labor is supplied by the negroes, who constitute about one-third of the population. The labor is abundant and cheap, but not always of the greatest efficiency. The usual wage for hired help is $15 a month. For picking cotton 60 cents a hundred pounds is the usual price. Very little farm labor is employed, the rule being to let land out to tenants rather than to farm it by hired labor. Share rent is the universal custom, the usual rent being one-third of the corn and one-fourth of the cotton. Occasionally the landlord furnishes everything—land, stock, implements, and seed—and gets half of the crop. Many of the renters are outfitted by the landlord or by some merchant; that is, he has all his family supplies furnished him, as well as the feed for his stock, and by the time the crop is harvested its value is spent and the tenant has to begin over again in debt.

About 30 per cent of the area of the county is cleared and cultivated. The average size of the farms, according to the last census report, is 91.4 acres.[a] Forty-seven per cent of the farms are operated by the owners. The average value of the land in the county is $6.50 an acre. The extremely rough land in the southern part of the county is worth $1 to $2 an acre. Much of the overflow land

[a] The individual holdings are probably considerably larger, as the census returned each tenancy as a "farm."

brings practically nothing after the timber is taken off. The poorer farming land is worth from $5 to $10 an acre. The better farming land is worth up to $20 an acre and in the immediate vicinity of the towns a little more. The productiveness of the soils indicates a value two or three times these figures, but the backward state of agriculture keeps prices depressed. Good business management applied to farming would undoubtedly show its effects not only in increased returns but in largely increased market value of the land.

Fertilizers are used to a considerable extent and their use is increasing. The favorite mixture consists of cotton-seed meal and acid phosphate. About 300 tons of all kinds of fertilizers were sold in the county during the season of 1908. Unfortunately, little discrimination is shown in the use of fertilizers. The following illustration will show the lack of knowledge of the underlying principles of plant nutrition. The managers of the large sawmill at Naples, which burns nothing but hardwood fuel under its great boilers, are not able to give away the tons of ashes produced. They hire a man to haul them out and dump them in a ravine. Still, the farmers are buying tons of potash in their commercial fertilizers and are paying fancy prices for it.

Many suggestions can be made in regard to improving the agriculture of the county. Cotton should be grown largely, because it is especially suited to the soil and climate and it is a staple cash crop. But the acreage should be restricted and a field should not be grown to cotton continuously until the yields decline, as is too often done. A systematic rotation, including cotton once in three years, can easily be planned that will give a profitable crop each year, and under such a system with an occasional dressing of barnyard manure the productiveness of the soil can be maintained indefinitely. A legume should be included in this rotation, and legumes should also be grown as catch crops before or after the main crop of the season. Cowpeas, peanuts, and many other legumes do well here, and more attention should be paid to them.

Level culture should take the place of ridge culture of cotton and corn. The fields should be cleared of stumps as soon as practicable to facilitate the use of two-horse tools and improved cultural implements. A field when once cleared should never be deserted, but a system of soil management that would insure continued profitable crops should be adopted. The first step in this direction is the rotation of crops above mentioned. The next thing of importance is to keep up the humus content of the soil. Fresh organic matter should be added to the soil as frequently as possible, and for this purpose nothing is better than plowing under cowpeas. Plowing should be deeper. Cultivation should be more thorough, especially in the cornfields and truck patches. Too many weeds are allowed to grow, and

the fence rows, in too many cases, are allowed to grow up to brush, weeds, and briers.

A great deal more care should be taken to prevent erosion, especially on the Susquehanna soils. In numerous cases careless cultivation has resulted in fields being ruined. The surface soil has been washed off and great gullies, in some places 10 or 15 feet deep, washed in the soil. The rows should follow the contour of the hills and the steeper hills should be terraced. Tile drainage, although entirely unknown in the county, would undoubtedly be found of great benefit on the level and poorly drained soils of the area.

A larger diversification of crops should be practiced. To this end a proper expansion of the fruit, potato, and truck growing industries is desirable. These crops are very profitable in themselves and they supply the means of diversifying the interests of the county. More and better live stock should be kept. They furnish a profit and besides necessitate the growing of more stock feed and thus aid in the diversification of crops. In addition they furnish a large amount of the most valuable fertilizer. All barnyard manure should be carefully saved and applied to the fields. Too much of it is allowed to go to waste at present. Bermuda grass should be more largely grown for both pasture and hay. This crop alone will enable more stock to be kept. Bermuda grass has been found very profitable on identical soils in other areas.

The betterment of the economic abuses will necessarily come slowly. The first thing sought should be independence of the money lender and merchant. This will no doubt necessitate sacrifice, but no legitimate business can thrive under the drains that the farming industry is undergoing at present in this area. Business should be brought to a cash basis as soon as possible. Farmers should become more independent of cotton. Crops should be diversified, and their own supplies should be raised as far as possible. Intelligent organization and cooperation among farmers for purposes of both buying and selling will tend very much to force a reform in distribution, which is very much needed not only in this county but all through this part of the South. Cooperation in both buying and selling has been found very advantageous in other States and should be a great aid here.

SOILS.

Morris County lies within the area known as the East Texas Timber Belt, and the classification of the soils is comparatively simple. The soils fall into two classes—upland soils and the bottom-land soils. The upland soils are divided into two groups, the Susquehanna series and the Norfolk series, while the bottom soils have been mapped as Trinity clay, Sanders clay, and Meadow.

According to Dr. C. H. Gordon, of the United States Geological Survey, the area lies within the outcrop of the lower Eocene known as the Sabine. This formation consists of stratified sands and clays. In places the sands are indurated to a ferruginous sandstone by the presence of oxide of iron. The clays occur interstratified and interlaminated with the sands, and sometimes in massive and stratified beds nearly free from sand. The Susquehanna series arises from this formation.

Resting upon this formation over the lower half of the county, except on the higher hills which apparently never were covered, and in other places where removed by erosion, is a deposit of a yellow or gray sand and sandy clay which is nearly free from gravel. The thickness of this formation does not usually exceed 8 or 10 feet, but some of the dunelike hills of sand are apparently very much deeper. According to the authority quoted above, the age of this deposit is not established, but it is thought to be redeposited Lafayette, possibly representing Port Hudson. This formation produces the Norfolk series, which is found over the more level stretches of the southern part of the county.

Along the large streams there have been recent deposits of alluvium, consisting of material washed from the older soils. The Trinity clay, which is found in the bottoms along the Sulphur River, is composed of alluvium brought down from the Grand Prairie region farther west. The Sanders clay is found in the bottoms of White Oak Creek and is derived from various light-colored soils farther west. The Meadow is found along Big Cypress Creek and the smaller streams of the county and is simply wash from near-by soils.

The following table gives the names and areas of the several soil types, while the accompanying map shows their distribution:

Areas of different soils.

Soils.	Acres.	Per cent.	Soils.	Acres.	Per cent.
Susquehanna fine sandy loam.	66,176	39.0	Trinity clay	6,528	3.8
Norfolk fine sandy loam	33,920	20.0	Sanders clay	6,272	3.8
Susquehanna gravelly loam	24,576	14.6	Rough stony land	832	.5
Meadow	13,504	7.9			
Norfolk fine sand	9,408	5.5	Total	169,600	
Susquehanna clay	8,384	4.9			

SUSQUEHANNA FINE SANDY LOAM.

The soil of the Susquehanna fine sandy loam consists of a loose-textured fine sandy loam, gray in color, varying from 6 to 15 inches in depth, and usually containing a small amount of ironstone gravel. The subsoil, where typically developed, consists of a tenacious red

clay containing but little sand or gravel. It is stratified and usually mottled with yellow or gray. There are, however, large areas where the subsoil is yellow and other areas where it contains considerable sand, but it has everywhere a characteristic joint structure. At depths below 3 feet thin strata of iron sandstone often occur and the clay frequently becomes more sandy.

This is an upland soil occurring over a large part of the county and especially prominent in the northern part. It is almost always well drained, and owing to its topography and the impervious nature of the subsoil is quite subject to washing. The topography, which varies from gently rolling to hilly, has been developed entirely by erosion. The type has been produced by the exposure and weathering of the lower Eocene formation. The original vegetation consisted almost entirely of hardwoods, with oak predominating. Only a small amount of pine is found on this type.

The Susquehanna fine sandy loam has been largely cleared and farmed and constitutes the main agricultural soil of the area. A great variety of crops is grown; it is suited to cotton, corn, oats, peas, potatoes, fruit, and truck. Cotton usually yields from one-fourth to three-fourths bale per acre, averaging less than one-half bale. Corn yields from 10 to 30 bushels per acre. The structure of the soil is loose and porous and cultivation is easy, except on the hillsides where erosion has exposed the underlying clay. Here it is tenacious and difficult to cultivate and yields are light. The market value runs from $5 to $20 an acre.

Erosion should be guarded against more than it is. Some fields have already been ruined by erosion, the result of careless farming. Rows should follow the contours of the hills, and the steeper hills should be terraced. Rotation of crops should be practiced. Green manuring has been found very profitable and may be generally recommended. If the humus of the soil is kept replenished, this is a type that will endure continued cultivation with little or no commercial fertilizers.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Susquehanna fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20842	Soil	0.0	0.3	0.3	24.5	47.6	23.5	3.7
20843	Subsoil	.0	.3	.2	18.9	24.3	16.7	39.4

SUSQUEHANNA GRAVELLY LOAM.

The soil of the Susquehanna gravelly loam consists of a reddish-gray loam or gray fine sandy loam, from 10 to 18 inches deep, containing a large proportion of coarse gravel and small stones, which consist of iron sandstone and iron concretions. The subsoil consists of a red clay, mottled with yellow, and containing considerable gravel and stone which is similar to that in the surface soil. This gravel makes the clay pervious to water which, coupled with the generally sloping surface, gives the soil good drainage. But the soil does not stand drought as well as the Susquehanna fine sandy loam. Stones of various sizes are found scattered through this soil, often in quantities sufficient to hinder cultivation. The type is early and where not too stony is easy to cultivate.

The topography varies from rolling to hilly, and the soil is found as the highest lands on the divides between the streams, except in the southern part of the county, where the highest land consists of Rough stony land. It owes its origin to the weathering of the sands and sandy clay strata of the lower Eocene formations. Some of the sandy layers have been cemented into a ferruginous sandstone, whence the gravel and stone found in the soil and subsoil. These strata appear to have been located above those which formed the Susquehanna fine sandy loam, and the hills composed of this soil are the remains of an early plain, the most of which has been removed by erosion.

The original forest growth was hardwood, mostly oak. This soil covers a considerable proportion of the county, and a large part of it has been cleared and farmed and has been found suitable to all the staple crops of the county, especially fruits. Since the advent of the boll weevil the earliness of this soil is found to be a distinct advantage, as it enables the cotton to be matured before the weevils become numerous enough to damage the crop seriously.

Cotton and corn are the main crops. Cotton will average one-third bale and corn between 10 and 25 bushels per acre. With good culture it produces a bale of cotton to the acre. Most of the peach orchards of the county are on this type and the soil is well suited to this crop. Pecans also do very well, and it is highly probable that grapes would do well, although no commercial vineyards are to be found in the county as yet.

Owing to the uneven topography erosion is very rapid and especial care should be taken to prevent the fields washing. Terracing should be practiced and the supply of humus in the soil should be kept up by heavy additions of organic matter. To conserve the moisture frequent cultivation should be given the fields as long as the crops

allow this to be done without injury. The market value of the land ranges from $5 to $15 an acre.

The following table gives the results of mechanical analyses of fine-earth samples of the soil and subsoil:

Mechanical analyses of Susquehanna gravelly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent*	*Per cent.*
20838	Soil	7.6	5.0	2.0	30.6	30.4	18.1	6.2
20839	Subsoil	1.6	1.7	1.2	30.9	19.6	12.5	32.2

SUSQUEHANNA CLAY.

The soil of the Susquehanna clay is a gray silty fine sand from 2 to 6 inches deep. The subsoil is a tenacious dull-red clay, mottled with gray or dull yellow. Frequently the subsoil loses the red color entirely and is a mottled dull yellow and gray. No stone or gravel is found in this type. In places it is low and undrained and the surface covered with low mounds. Here the surface soil is somewhat deeper and the subsoil nearly white.

The Susquehanna clay is found in the extreme northern part of the county, between Sulphur and White Oak creeks, and occupies a large proportion of the low ridge separating these streams. The topography is nearly level and the drainage is in many cases very poor. The native timber is thin and not of much value, consisting mostly of black-jack oak. The soil owes its origin to the weathering of the heavier clay beds of the Lower Eocene formations.

Very little farming is done on this type. It is a hard refractory soil to handle and, moreover, on account of its location between two large streams, it is somewhat inaccessible. It is probably the lowest in agricultural value of any soil in the county, but if properly handled it should be capable of producing fair yields of the staple crops of the area. It would undoubtedly be benefited by surface drainage and underdrainage. The supply of organic matter in the soil should be largely increased by such methods as plowing under cowpeas. Great care would have to be used in cultivating the soil. It should be plowed only when it is in the most friable condition; that is, when it is neither too wet nor too dry. At present it ranges in value from $2 to $5 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Susquehanna clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20840	Soil	0.0	1.1	0.2	4.1	18.0	60.6	15.9
20841	Subsoil	.0	1.0	.3	1.1	3.6	35.7	58.3

NORFOLK FINE SANDY LOAM.

The soil of the Norfolk fine sandy loam consists of a gray fine sandy loam extending to a depth of 12 to 24 inches. The subsoil consists of a yellow sandy clay which reaches a depth of 3 to 10 feet where it rests upon stiff clay. Soil and subsoil are entirely free from gravel and there is apparently no stratification.

The type wherever found in the area is quite uniform. The only exception to this rule is that in some low areas it occupies undrained "glades" and the surface soil in this case has a little more silt in it, making it somewhat heavier. The soil is derived from some one of the later geological formations, probably the Port Hudson.

The original forest growth was mixed pine and hardwoods and the soil when first cleared has a good proportion of humus in it and is very productive. It is good farming land and holds up well under cultivation, but is not esteemed in this county as highly as the better grades of the Susquehanna. It is found in large areas in the southern part of the county and there are some fair-sized areas in the central part. It occupies in the main the lower levels, and covers only the lower hills.

The topography is level to gently rolling. Occasionally the surface is partially covered with small mounds a few rods in diameter and from 1 to 3 feet high. These mounds are composed of the fine sandy loam that constitutes the surface soil in other places. The mounds occupy from one-fourth to three-fourths of the surface of the area where found. This is an easy soil to cultivate and the subsoil contains enough sand and silt to make it fairly pervious to water. It stands drought well, but on the lower levels where drainage is not the best, it is inclined to be late.

The Norfolk fine sandy loam is mostly planted to cotton and corn. Cotton yields from one-fourth to 1 bale per acre, averaging one-half bale. Corn does well, yielding from 10 to 40 bushels, and averaging 20 bushels per acre. Very little fruit or truck is grown on this soil, mainly for the reason that the soil is only sparingly found in the northern part of the county where these industries are most largely

developed. However, peaches have been found not to do so well as on the Susquehanna gravelly loam. Potatoes do quite well, yielding from 40 to 125 bushels per acre and averaging about 60 bushels. Cowpeas, oats, peanuts, and Bermuda grass all thrive. It is believed that truck will find the soil adapted to its needs. Level culture, rotation of crops, and the growing of legumes are recommended. Artificial drainage will be found quite profitable in many places. The land is valued at $6 to $20 an acre, and near the towns brings even a higher price.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20836	Soil	0.0	0.5	0.8	21.1	40.8	31.7	4.9
20837	Subsoil	.0	.3	.5	25.8	27.0	23.7	22.6

NORFOLK FINE SAND.

The soil of the Norfolk fine sand is a gray medium or fine sand 6 inches deep, containing when first brought under cultivation a fair amount of organic matter in the surface. It grades imperceptibly into the subsoil, which extends to a depth of from 3 to 6 feet, being on some dunelike hills considerably deeper. The subsoil is a uniform fine sand, free from gravel and gray in color.

The topography is rolling, the hills often resembling dunes, though there is at present no drifting of the soil. Like the Norfolk fine sandy loam, the type is probably derived from the Port Hudson formation. The orginal forest growth consisted of pine and hardwoods. The type is not extensive and is found in small areas scattered over the central and southern parts of the county.

The structure of the soil is very loose and porous, and it is the most easily cultivated soil in the area. For this reason it was sought out and cleared by the early settlers, and to this day it is prized more highly than its true merit warrants. However, it seems more productive than the same type as found in other areas. This is probably due to the fact that clay lies at no great distance below the surface. In some cases the sand has mingled with it a small proportion of silt or clay, which gives the soil some adhesiveness and increases its capillary power.

It is especially adapted to early crops and to truck and fruit. Potatoes do well, but the greater area is given to the staple crop,

cotton. It is said that cotton will average one-half bale to the acre when the boll weevil does not attack it. Corn yields from 10 to 20 bushels per acre.

The chief need of the Norfolk fine sand is organic material, which in many of the fields has become noticeably deficient. This condition could best be remedied by the growing of leguminous catch crops and the use of a regular crop rotation, including some of the legumes. The market price of this soil varies from $7 to $20 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Norfolk fine sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20834	Soil	0.0	0.3	2.0	25.3	39.2	29.3	3.7
20835	Subsoil	.0	.4	2.3	25.2	39.4	28.3	4.2

SANDERS CLAY.

The soil of the Sanders clay consists of 6 to 8 inches of a light-gray silty clay. The subsoil to a depth of 3 feet is an ashy-gray, sticky, impervious clay, becoming almost white in color on exposure to the sun. In places both soil and subsoil contain a high percentage of silt and at times a small quantity of very fine sand. When wet the soil is sticky and plastic, and the presence of numerous reddish-brown iron stains gives it a slightly mottled appearance, which becomes quite marked in the lower depths.

A bottom-land type, the topography is level, and so low that it is subject to frequent overflow. The largest area mapped lies along White Oak Creek. The smaller areas are also in the northern part of the county, on tributaries of this stream. The soil is alluvial and is formed from a mixture of the wash from the adjacent soils and from the prairie regions at the head of White Oak Creek.

The native vegetation consists of a forest growth of oak, gum, hickory, ash, and other species of deciduous trees. After the timber is removed the land has a low value—$1 to $3 an acre—and on account of the frequent overflow very little of the area is farmed, pasturing being its principal use. Under proper drainage conditions this soil should produce good yields of corn and cotton. There is no doubt that this soil is well adapted to the production of Bermuda grass.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Sanders clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20832	Soil	0.0	2.4	1.9	4.8	3.4	35.7	51.8
20833	Subsoil	.0	1.1	.6	1.9	1.9	27.3	66.9

TRINITY CLAY.

The Trinity clay consists of a black, heavy clay loam, from 3 to 6 inches deep, containing considerable organic matter, and underlain with a subsoil which is a drab or dark-gray clay extending to a depth of at least 3 feet. The soil in periods of drought cracks and breaks very badly. When wet it is exceedingly sticky and plastic and travel across it is nearly impossible.

This soil is found in the extreme northern part of the county on the flood plain of the Sulphur River. It is quite level and much of it poorly drained. It is alluvial and owes its origin to the wash from soils of the Grand Prairie region transported by the river. It is subject to frequent overflows, and, on account of the level surface and retentive nature of the soil, it stays wet for weeks after floods have subsided.

These bottoms are now being cleared of their valuable growth of hardwoods by the large sawmill located at Naples. None of the type is farmed at present, owing to the liability of overflow, but the soil is very rich and strong, and if flooding could be prevented it would become the most productive type of the county. It is well adapted to cotton, corn, and grass. At present it is used only for pasture, which during the winter and spring is quite valuable. Pasturage in the summer time is much lessened in value by the pest of insects. After the timber has been removed the price of the land is very low—from $1 to $3 an acre.

The following table gives the results of mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Trinity clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
20844	Soil	0.1	2.0	6.3	13.3	10.6	42.0	25.8
20845	Subsoil	.0	.3	.3	3.4	16.8	44.7	34.3

MEADOW.

Meadow varies considerably in texture. It is recent alluvial soil situated along the streams and has somewhat the character of the adjacent soil, from which it was derived through wash. Areas along the smaller streams are for the most part sandy.

Very little of this type is cultivated, for it is all subject to overflow. Occasionally a small area a few feet higher than the rest of the bottom is cleared and cultivated and in such situations it is very productive. Sugar cane is the favorite crop and does exceedingly well. Bermuda grass has been tried in a very limited way and it is probable that this is the most profitable crop that can be grown on the soil, for it is not injured by overflow. It can either be pastured or cut for hay.

The areas of Meadow were originally covered with a heavy growth of deciduous trees, mostly oaks, hickory, and gum. Much of this growth is still standing. The mast falling from these trees makes valuable feed for hogs. The switch cane which occurs as an undergrowth also makes valuable pasturage.

This soil brings $3 or more an acre, depending upon the amount of standing timber.

ROUGH STONY LAND.

Rough stony land is found on the hills in the extreme southern part of the county and in one or two small areas near the middle of the county. These hills rise from 200 to 300 feet above the flood plain of Big Cypress Creek, which flows near them. Erosion is very active; a little soil is found mingled with the rocks, but the land is everywhere too rough and stony for cultivation, and in most places there is practically no soil, the surface of the hills consisting of huge blocks of weathered brown sandstone. The stone is a ferruginous sandstone, and the iron is abundant enough in places to constitute ore.

The native vegetation is almost entirely hardwood timber, very little pine being found on these hills. Some of the land has changed hands lately at $1 to $2 an acre.

SUMMARY.

Morris County lies in the northeastern part of Texas, in the timber belt, the timber consisting of hardwoods, with a little pine in the southern part of the county. The surface is gently rolling and drainage on the uplands is good. Thirty per cent of the county is now cleared and farmed. The cleared land is all located on the uplands. The streams flow through broad flat bottoms that are subject to overflow and are poorly drained and swampy.

The county was settled in the forties and fifties by immigrants from Tennessee, Georgia, and Alabama. There are about 10,000 people in the county at the present time and they are nearly all descendants of these earlier settlers.

There are no large towns in the county, and its wealth, aside from that derived from its diminishing forests, is entirely agricultural. Shipping facilities are good, as two railroads cross the county.

The climate is suited to a great diversity of crops and is especially favorable to cotton, as the summers are long. Precipitation is ample and is well distributed.

Cotton and corn were the crops grown by the early settlers, and a great deal of stock was raised and allowed to range in the woods. The one-crop system was largely followed, and when a field dropped low in productiveness a new field was cleared. At present the agriculture is in a transitional stage. Many of the leading farmers are diversifying their crops and planting crops in rotation. Fruit and truck are being more largely grown.

The development of the county is much retarded by the adverse economic conditions. Distribution costs too much and interest rates are too high.

Five types of soil were mapped in the uplands and three in the bottoms, besides which a small amount of Rough stony land was found. The upland soils are of fair productiveness, and with proper management can be made to produce very profitable crops. They are for the most part easily worked, their main deficiency being a low humus content. Besides being suited to the main staple crops, cotton and corn, they also are well suited to fruits of many kinds, melons, trucks, cowpeas, peanuts, and other lesser crops.

The area of cotton should be restricted and it should be grown in rotation with other crops. The productiveness of the soil should be kept up by a systematic rotation, the growing of legumes, and more careful methods of culture. More and better live stock should be kept; their feed should all be grown on the farm and the manure saved and applied to the soil. A greater variety of crops should be grown by the average farmer. Fruit, potatoes, and truck crops are the most promising introductions. The farmers should cooperate in marketing their crops and in purchasing supplies.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457–3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers. If you believe you experienced discrimination when obtaining services from USDA, participating in a USDA program, or participating in a program that receives financial assistance from USDA, you may file a complaint with USDA. Information about how to file a discrimination complaint is available from the Office of the Assistant Secretary for Civil Rights. USDA prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex (including gender identity and expression), marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.)

To file a complaint of discrimination, complete, sign, and mail a program discrimination complaint form, available at any USDA office location or online at www.ascr.usda.gov, or write to:

USDA
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, S.W.
Washington, DC 20250-9410

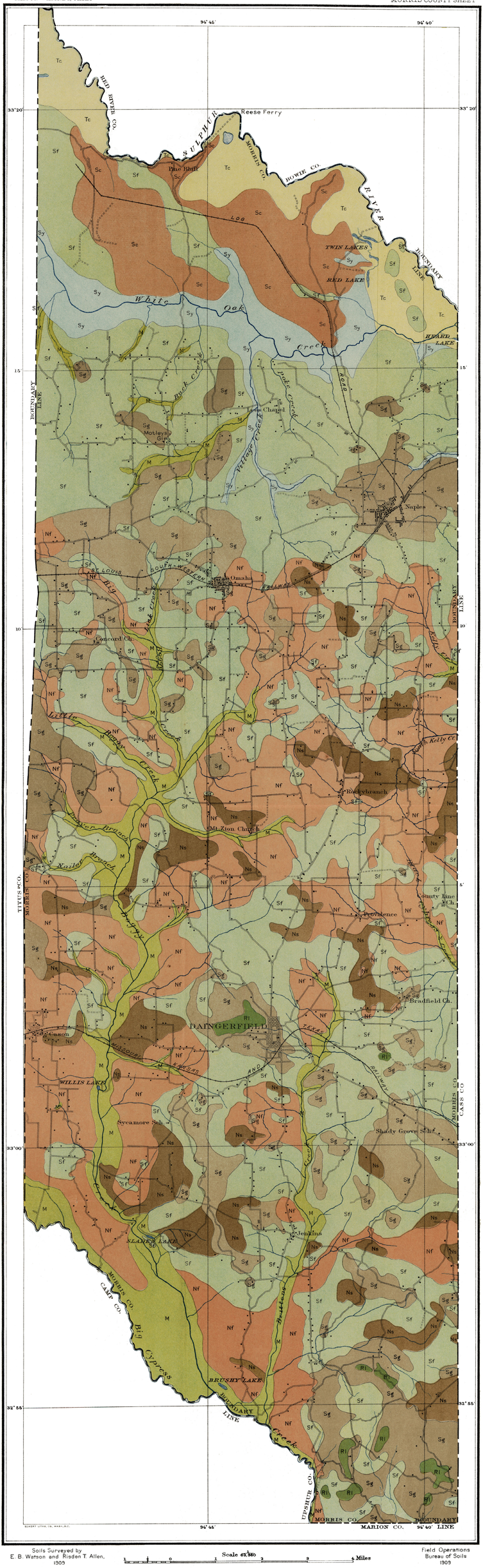
Or call toll free at (866) 632-9992 (voice) to obtain additional information, the appropriate office or to request documents. Individuals who are deaf, hard of hearing, or have speech disabilities may contact USDA through the Federal Relay service at (800) 877-8339 or (800) 845-6136 (in Spanish). USDA is an equal opportunity provider, employer, and lender.

Persons with disabilities who require alternative means for communication of program information (e.g., Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

U.S. DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF

SOIL MAP

TEXAS
MORRIS COUNTY SHEET



SOIL PROFILE
(3 feet deep)

Susquehanna gravelly loam
Fsl
C

Susquehanna fine sandy loam
Fsl
C

Susquehanna clay
Sil
C

Norfolk fine sand
Fs
S

Norfolk fine sandy loam
Fsl
Sc

Sanders clay
Sic
C

Trinity clay
Hl
Cl

LEGEND

Fsl = Fine sandy loam
C = Clay
Sil = Silt loam
Fs = Fine sand
S = Sand
Sc = Sandy clay
Sic = Silty clay
Hl = Heavy loam
Cl = Clay loam

LEGEND

Susquehanna gravelly loam
Sg

Susquehanna fine sandy loam
Sf

Susquehanna clay
Sc

Norfolk fine sand
Ns

Norfolk fine sandy loam
Nf

Sanders clay
Sy

Trinity clay
Tc

Meadow
M

Rough stony land
Rl

Soils Surveyed by
E. B. Watson and Risden T. Allen,
1909

Scale 1:62,500
1 0 1 2 3 4 Miles

Field Operations
Bureau of Soils
1909